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23 OCT 03 EH46517-2 D02807
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22 OCT 2003

Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

The Patent Office

Cardiff Road
Newport
South Wales
NP10 8QQ

22 OCT 2003

1. Your reference

KSW/RTB/38423

2. Patent application number

(The Patent Office will fill this part in)

0324647.7

3. Full name, address and postcode of the or of each applicant (underline all surnames)

James Richard John DUKE
Ham Road
Sidlesham
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West Sussex PO20 7NY

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

08738031001

4. Title of the invention

MILKING EQUIPMENT AND METHOD

5. Name of your agent (if you have one)

BARON & WARREN

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

19 South End
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LONDON
W8 5BU

Patents ADP number (if you know it)

281001 ✓

6. Priority: Complete this section if you are declaring priority from one or more earlier patent applications, filed in the last 12 months.

Country

Priority application number
(if you know it)Date of filing
(day / month / year)

7. Divisionals, etc: Complete this section only if this application is a divisional application or resulted from an entitlement dispute (see note f)

Number of earlier UK application
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8. Is a Patents Form 7/77 (Statement of inventorship and of right to grant of a patent) required in support of this request?

Answer YES if:

- a) any applicant named in part 3 is not an inventor, or
- b) there is an inventor who is not named as an applicant, or
- c) any named applicant is a corporate body.

Otherwise answer NO (See note d)

No

Patents Form 1/77

9. Accompanying documents: A patent application must include a description of the invention. Not counting duplicates, please enter the number of pages of each item accompanying this form:

Continuation sheets of this form

Description 5

Claim(s) *CF*

Abstract

Drawing(s) 1 + 1

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77)

Request for a preliminary examination and search (Patents Form 9/77)

Request for a substantive examination (Patents Form 10/77)

Any other documents (please specify)

11. I/We request the grant of a patent on the basis of this application.

Signature(s)

Keith S Warren
Agents for the Applicant

Date 22-10-03

12. Name, daytime telephone number and e-mail address, if any, of person to contact in the United Kingdom

Keith S Warren - 020 7937 0294

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Notes

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- b) Write your answers in capital letters using black ink or you may type them.
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MILKING EQUIPMENT AND METHOD

The present invention relates to milking equipment and, more particularly, to a novel teat or milking cup enabling the application of washing fluid, such as a sanitising and conditioning fluid, to the teat of an animal 5 subsequent to or post-milking.

A standard teat cup comprises a hollow shell supporting a flexible liner which, at the upper end of the cup, has a head portion with an opening through which a teat is engaged with the cup and the liner. At the opposite bottom end of the cup, the liner is in communication with a milk delivery tube. 10 The head is designed so as to provide a void about a teat engaged with the cup. Upon commencement of milking, a vacuum is applied to the milk delivery tube for the purposes of extracting milk from the cup and, upon initial application of this vacuum, it is applied to the void in the head of the liner which captures the cup on the teat. Thereafter, milking is achieved by 15 automatically and alternately applying vacuum and pressure pulses to the space between the shell and the liner in order to flex the liner and stimulate discharge of milk from the teat. The milk discharged from the teat is removed from the bottom of the cup via the milk delivery tube under the action of the vacuum applied to the tube.

20 After milking, animals teats are typically manually dipped, sprayed or otherwise washed with a sanitising and conditioning fluid, for example, iodine or chlorohexidine and an emollient. In addition to being labour-intensive, other drawbacks of such manual washing are that the washing process may not be carried out in a timely fashion and the quality of the washing is 25 variable and dependent upon the operator. Mechanical devices are available for mechanical spraying of the washing fluid but these tend to give variable results. Moreover, whether manual or mechanical spraying is utilised, the resulting vapour or spray mist poses a health risk.

An object of the present invention is to alleviate the aforementioned 30 problems associated with the current techniques employed for washing animals teats after milking.

To this end, the invention consists in a teat cup for milking equipment wherein the cup has nozzle means for injecting washing fluid into the head of

the liner and on to a teat engaged by the cup, the nozzle means being connectable to a washing fluid supply tube.

The invention enables washing fluid to be injected manually or automatically into the head of the cup liner. By injecting fluid at this position

5 prior to removal of the cup from the teat, the teat is coated immediately after milking giving protection before the teat is exposed to the environment. Moreover, any vapourised liquid is contained within the head of the liner thereby reducing the emission of vapour and spray mist associated with both current and manual automatic spray devices with consequent reduction of the

10 health risk. Moreover, the process of injecting washing fluid into the head of the liner can be fully automated saving labour costs and affording the operator more time to spend on pre-milking routines. Furthermore, the invention renders the washing process economical in fluid use and the amount of fluid used can be calibrated so as to minimise waste and also any

15 environmental impact.

The invention also consists in milking equipment comprising a cluster of teat cups in which each teat cup is constructed as described above.

When the invention is used with automatic milking equipment in which a cluster teat cups are engaged with the teats of a cow, for example, a

20 suitable signal can be derived from the milking equipment at the end of the milking operation, for example, in response to the signal initiating automatic cluster removal, in order to initiate injection of the washing fluid. The relevant signal initiates the injection cycle and fluid is injected into the heads of the liners and into the voids about the animals teats. The washing fluid is thus

25 applied to the teats and is wiped down the latter as the teat cups are removed. After removal of the cluster, a further signal can be derived from the equipment in order to trigger a back flushing unit which then flushes the cup liners via the milk delivery tubes so as to remove traces of the injected fluid and sterilise the teat cups ready for the next milking operation. The

30 cycle may be managed by suitably programmed electronics with the application of the fluid being controlled by pneumatic valves or the like.

The invention also consists in a method of milking comprising the steps of applying a teat cup to the teat of an animal to be milked, actuating the cup to perform a milking operation, detecting when milking is to be

terminated, injecting washing fluid into the head of the teat cup and on to the teat in response to said detecting step, and simultaneously or immediately after injection withdrawing the cup from the teat, thereby to wipe the teat with the fluid. Conveniently, a pulse of compressed air is delivered to the space 5 between the teat and the head of the liner, subsequent to the injection of washing fluid, in order to facilitate removal of the cup from the teat.

In order that the present invention may be more readily understood, reference will now be made to the accompanying drawings, in which:-

Figure 1 is an elevational view of a teat cup embodying the invention, 10 and

Figure 2 is an axial section of the teat cup shown in Figure 1.

Referring to the drawings, the teat cup 1 comprises a hollow cylindrical shell 2 supporting a flexible liner 3 in spaced relation with the shell. The liner is sealed to the shell at the bottom end 4 of the cup and, at the top end 5, has 15 a head portion 6 which engages about the outside of the shell in order to seal the top end of the liner to the shell. The head of the liner is formed with an opening 7 permitting access to the internal passage 8 within the liner. Between the top of the shell and the opening 7, the head of the liner is formed with an internal annular cavity 9 which, when an animal's teat (shown 20 in broken lines in Figure 1) is inserted into the cup through the opening 7 forms a void or space 10 between the side of the teat and the head. At the bottom end 4 of the cup, the liner is integral with a milk delivery tube 11 via which vacuum is applied to the inside of the liner for removing from the cup milk discharged by the teat during the milking process. By way of example, 25 the shell 2 may be produced from stainless steel or plastics material and the liner 3 may be moulded from resilient plastics, synthetic rubber or silicone.

As will be appreciated by those skilled in the art, the cup is fitted with suitable means (not shown) for connecting the space 12 between the shell and the liner to milking equipment which alternately supplies a vacuum pulse 30 and connects the space to atmosphere in order to cause the liner 3 to flex against the teat and perform a milking operation.

Projecting through the head of the liner, into the cavity 9 on the inside of the liner, is an injection nozzle 13 which is secured through the wall of the head. Externally of the head, the nozzle 13 is coupled to a supply tube 14 for

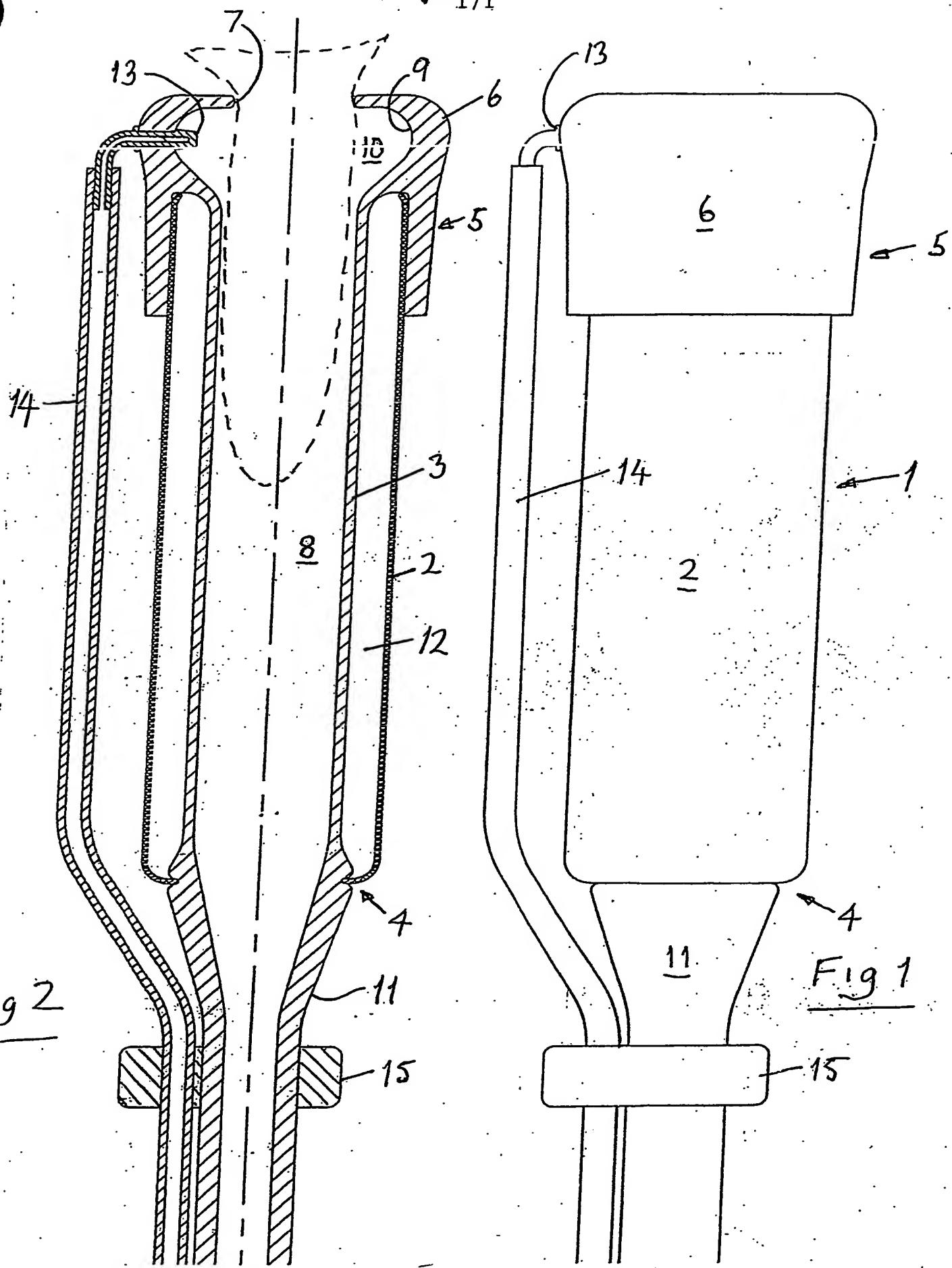
delivering fluid to the nozzle. This tube extends down the side of the cup 1 and is held in position adjacent the cup by a securing collar 15 attaching the tube 14 to the milk delivery tube 11. At its distal end, the tube 14 is coupled to a valve mechanism (not shown) so as to be selectively connectable to a 5 supply of washing fluid, such as sanitising fluid, and compressed air.

The illustrated teat cup 1 may be one of several similar teat cups, for example, four, arranged in a cluster and connected to conventional automatic milking equipment. When a cow, for example, is to be milked, the teat cluster is manually or automatically fitted over the cow's teats so as to position the 10 teats as illustrated in broken lines in Figure 2. When the teat cups have been fitted and the automatic milking equipment is actuated, vacuum is applied to the delivery tube 11 which, via the liner 3, is applied to the void 10 between the teat and the head 6 of the liner so as to capture the cup on the teat. Vacuum and pressure are then alternately applied in pulses to the space 12 15 between the liner and the shell in order to flex the liner against the teat and stimulate milking. Milk discharged by the teat into the internal passage 8 of the liner is extracted from the liner via the milk delivery tube 11 and delivered to a suitable collecting vessel.

At the termination of milking, which is detected by the automatic 20 milking equipment as a reduction of milk flow below a predetermined level, the means which is provided for automatically removing the cluster from the cow's udder is signalled to actuate removal. In response to such a signal, the fluid supply mechanism and associated valve mechanism may also be actuated so as to inject a predetermined quantity of sanitising and 25 conditioning fluid, via the supply tube 14 and the nozzle 13, into the void 10 and about each teat. The injection of this fluid is timed to occur upon, after or immediately prior to actuation of the cluster removal. Removal of the cluster from the teats may be aided by delivering a charge of compressed air through the supply tube 14 and the nozzle 13 and into the void 10 in each 30 cup as the cups are being removed. In any event, as the cups are removed, the fluid is sprayed, spread or wiped down the outside of each teat thus ensuring that the whole teat is covered with sanitising and conditioning fluid. Containing the fluid within the voids as the cups are removed from the teats alleviates the problem of fluid vapour or mist in the surrounding environment

and consequent health risks. When the automatic milking equipment signals complete removal of the cluster from the teats, this may initiate actuation of a back flushing unit that then flushes the tubes 11 and liners 3 to remove traces of sanitising and conditioning fluid and sterilise the teat cups for subsequent use.

Whilst a particular embodiment has been described, it will be understood that modifications can be made without departure from the scope of the invention. For example, the teat cup may be fitted with more than one nozzle 13 for injecting washing fluid into the void 10 in the associated head 6 of the cup and these nozzles may be supplied via one or more fluid supply tubes 14. The fluid supply tube(s) 14 may be disposed internally of the teat cup instead of external as described above.



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